

IN THE CLAIMS

- 1
1 1. (original) A method of forming a magnetic tunnel junction device,
2 comprising:
3 forming a first magnetic layer and a second magnetic layer, at least one of the first
4 and the second magnetic layers including diffusion components selected to adjust one or
5 more properties of the magnetic tunnel junction device; and
6 forming a barrier layer between the first and the second magnetic layers, the
7 barrier layer comprising migrated diffusion components from the at least one magnetic
8 layer, wherein the diffusion components adjust the one or more properties.
- 1 2. (original) The method of claim 1, wherein the diffusion components are
2 selected to adjust a series resistance of the magnetic tunnel junction device.
- 1 3. (original) The method of claim 1, wherein the diffusion components are
2 selected to decrease a bandgap of the barrier layer.
- 1 4. (original) The method of claim 1, wherein:
2 forming the first magnetic layer comprises forming a pinned magnetic layer; and
3 forming the second magnetic layer comprises forming a free magnetic layer.
- 1 5. (original) The method of claim 1, wherein one or more of the first and the
2 second magnetic layers comprises a multi-layer structure.
- 1 6. (original) The method of claim 1, wherein one or more of the first and the
2 second magnetic layers comprises an alloy of CoFe.
- 1 7. (original) The method of claim 6, wherein the alloy of CoFe comprises
2 CoFeHf.

1 8. (original) The method of claim 7, wherein the CoFeHf comprises about 5
2 to about 10 atomic percent Hf.

1 9. (currently amended) The method of claim 6, wherein the ~~[[allow]]~~ alloy
2 of CoFe comprises CoFeZr.

1 10. (original) The method of claim 9, wherein the CoFeZr comprises about 5
2 to about 10 atomic percent Zr.

1 11. (original) The method of claim 1, wherein the diffusion components
2 comprises Hf.

1 12. (original) The method of claim 1, wherein the diffusion components
2 comprises Zr.

1 13. (original) The method of claim 1, wherein forming the first and the
2 second magnetic layers comprises forming at least one amorphous layer.

1 14. (original) The method of claim 1, wherein forming the barrier layer
2 comprises forming a layer comprising a compound of AlOx having a thickness of about 3
3 Δ to about 6 Δ .

1 15. (original) The method of claim 1, wherein the forming the barrier layer
2 comprises forming a barrier layer comprising AlHfOx.

1 16. (original) The method of claim 1, wherein forming the barrier layer
2 comprises forming a barrier layer comprising AlZrOx.

1 17. (currently amended) A method of forming a magnetic tunnel junction
2 device, comprising:
3 forming ~~an magnetic~~ a magnetic tunnel junction active region, comprising:
4 a first magnetic layer and a second magnetic layer, at least one of the first and the second
5 magnetic layers including diffusion components selected to adjust one or more properties
6 of the magnetic tunnel junction device; and
7 a barrier layer between the first and the second magnetic layers; and
8 annealing the active region to enhance migration of the diffusion components from the
9 first magnetic layer to the barrier layer, wherein the migrated diffusion components
10 adjust the one or more properties.

1 18. (original) The method of claim 17, wherein the at least one layer
2 comprises an alloy of CoFe.

1 19. (original) The method of claim 17, wherein the at least one layer
2 comprises CoFeHf.

1 20. (original) The method of claim 19, wherein the CoFeHf comprises about
2 5 to about 10 atomic percent Hf.

1 21. (original) The method of claim 17, wherein the at least one layer
2 comprises CoFeZr.

1 22. (original) The method of claim 21, wherein the CoFeZr comprises about 5
2 to about 10 atomic percent Zr.

1 23. (original) The method of claim 17, wherein the diffusion components
2 comprise Hf.

1 24. (original) The method of claim 17, wherein the diffusion components
2 comprise Zr.

1 25. (original) The method of claim 17, wherein the barrier layer has a
2 thickness of about 3 Å to about 6 Å.

1 26. (original) The method of claim 17, wherein annealing the active region
2 comprises annealing the active region at a temperature of less than about 300 C.

1 27. (original) The method of claim 17, wherein the diffusion components are
2 selected to decrease a series resistance of the active region.

1 28. (original) The method of claim 17, wherein annealing the diffusion
2 components are selected to decrease a band gap of the barrier layer.

1 29. (original) The method of claim 17, wherein annealing the active region to
2 enhance migration of the diffusion components from the first magnetic layer to the
3 barrier layer comprises forming AlHfOx in the barrier layer.

1 30. (original) The method of claim 17, wherein annealing the active region to
2 enhance migration of the diffusion components from the first magnetic layer to the
3 barrier layer comprises forming AlZrOx in the barrier layer.

1 31. (original) A method for sensing a magnetic field, comprising:
2 forming a magnetic tunnel junction device having an active region, comprising:
3 a first magnetic layer and a second magnetic layer, at least one of the first and the second
4 magnetic layers including diffusion components selected to adjust one or more properties
5 of the magnetic tunnel junction device; and
6 a barrier layer between the first and the second magnetic layers; and
7 annealing the active region to enhance migration of the diffusion components from the
8 first magnetic layer to the barrier layer, the migrated diffusion components adjusting the
9 one or more properties;
10 driving the magnetic tunnel junction device using an electrical signal; and
11 detecting an electrical resistance based on magnetic orientations of the first and the
12 second magnetic layers.

1 32. (original) The method of claim 31, wherein the at least one layer
2 comprises CoFeHf.

1 33. (original) The method of claim 31, wherein the at least one layer
2 comprises CoFeZr.

1 34. (original) The method of claim 31, wherein the diffusion components
2 comprise Hf.

1 35. (original) The method of claim 31, wherein the diffusion components
2 comprise Zr.

1 36. (original) The method of claim 31, wherein annealing the active region
2 comprises annealing the active region at a temperature of about 300 C.

1 37. (original) The method of claim 31, wherein the diffusion components are
2 selected to reduce a series resistance of the active region.

1 38. (original) The method of claim 31, wherein the diffusion components are selected
2 to decrease a bandgap of the barrier layer.

1 39. (original) The method of claim 31, wherein annealing the active region to
2 enhance migration of the diffusion components from the first magnetic layer to the barrier layer
3 comprises forming AlHfOx in the barrier layer.

1 40. (original) The method of claim 31, wherein annealing the active region to
2 enhance migration of the diffusion components from the first magnetic layer to the barrier layer
3 comprises forming AlZrOx in the barrier layer